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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 24

Application Number: 09/386,112
Filing Date: August 30, 1999
Appellant(s): BRUCE ET AL.

Eric J. Curtin
For Appellant

EXAMINER'S ANSWER

This is in response to appellant's brief on appeal filed 25 February 2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is substantially correct. The changes are as follows:

Issues 1 and 2: is the rejection of claims 1, 2, 7, and 9-15 under 35 U.S.C. 103(a) proper ?

Issues 3 and 4: is the rejection of claims 1-16 under 35 U.S.C. 112, 1st paragraph proper ?

Issues 5 and 6: is the rejection of claims 1-16 under 35 U.S.C. 112 2nd paragraph proper ?

Appellant's brief presents arguments relating to the finality of claims 1-16 under 35 U.S.C. 112, 1st paragraph. This issue relates to petitionable subject matter under 37 CFR 1.181 and not to appealable subject matter. See MPEP §§ 1002 and 1201.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 1-16 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

The following is a listing of the prior art of record relied upon in the rejection of claims under appeal.

5,880,838	Marx et al	3-1999

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-16 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

On page 6, lines 4-6 applicant states that interferometry techniques, such as dual-differential detection, are used to profile the surface of the die.

On page 8, lines 9-15 applicant investigated possible defects by directing light through a pair of beam-splitters which are used to create a differential of two beams of light. One light beam is directed into the back side of the semiconductor die and reflected by the surface under test along with a nonreflected beam. The reflected and nonreflected beams are analyzed to determine if there is a surface defect. Analysis can include comparison with a previously generated reference surface.

On page 10, lines 12+ applicant discloses the operation of figure 2 which is used to obtain a profile of the reference die and the dies under test. Light from a laser(210) passes through a first linear polarizer(212), beam-splitter(220), and ½ waveplate(214), to a surface(231) under test. The reflected light passes back though the ½ waveplate, is reflected by the beam-splitter(220), and is divided by a beam-splitter(222) into two beams which are detected by two detectors and a profile is generated for the surface. Applicant then points to the text of *Confocal Scanning Microscopy and Related Imaging Systems* and supplies pages 232 and 233 from the text.

The provided text of *Confocal Scanning Microscopy and Related Imaging Systems* discloses a typical confocal interference microscope. A laser generates an input beam which is split by a beam-splitter into test and reference beams. The test beam is reflected from the surface of the sample and is recombined with the

reference beam which is reflected by a reference mirror. The beams are recombined at the beam-splitter to constructively interfere. The interfered beams are detected by two detectors which are processed to provide profile of the surface of the sample.

Page 6, lines 4-6, page 8, lines 9-15, and pages 232 and 233 of *Confocal Scanning Microscopy and Related Imaging Systems* are all directed to interference profilometry.

The specification fails to describe how an interference profile is generated from the disclosed invention in order to detect the defects thereon. The closest applicant gets to disclosing any interference is at page 6, lines 11-13 stating "a differential of two beams of light one of which is directed into the back of the semiconductor die and reflected from a surface therein for evaluation along with the nonreflected beam". However how the reflected and nonreflected beams are combined is not disclosed.

Claims 1-16 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite as to how the first beam of light detects defects from the surface of the die. The first beam of light is directed into the back side of the semiconductor die which reflects a second light beam. Because the back side of the semiconductor die is the only surface positively claimed "which reflects a second

light beam" no defects are imprinted onto the reflected second light beam. Claim 3 is specific in that it is the back surface which reflects the second light beam.

Claim 1 is incomplete as to how any profile of the circuit side of the die is formed for comparison as there is no interference claimed.

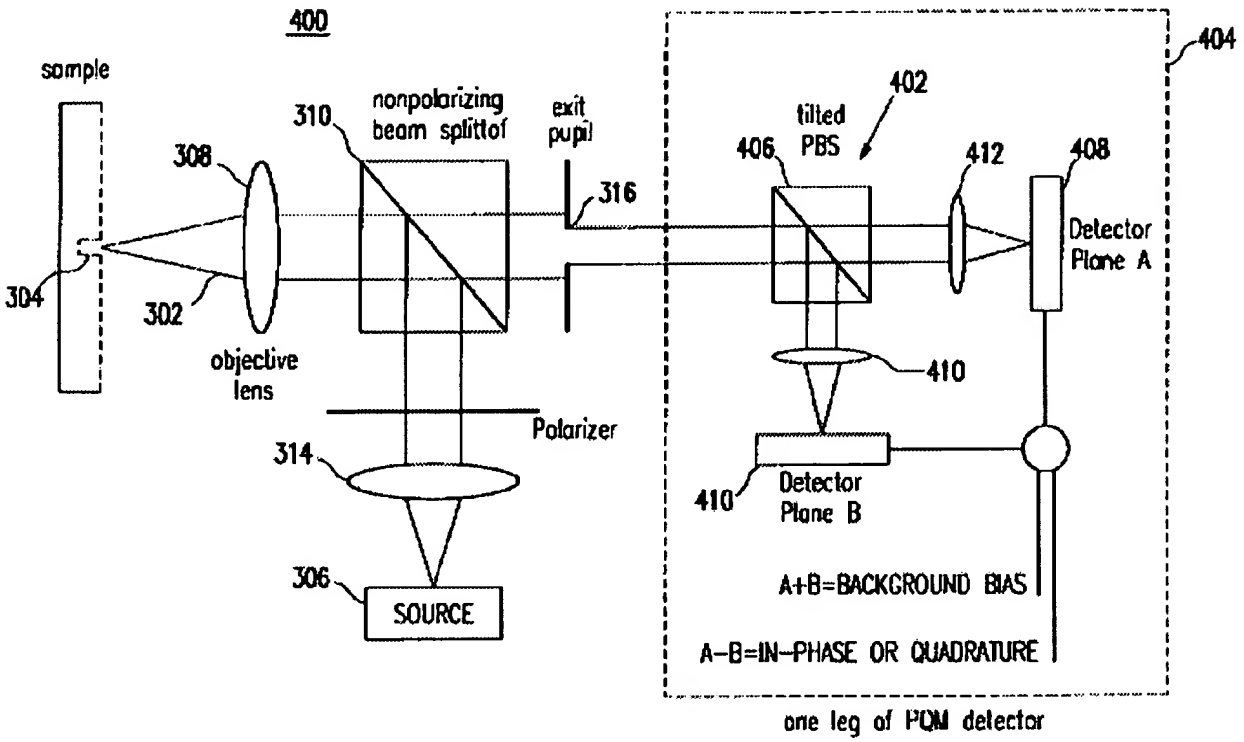
Claim 10 is indefinite as to how the first beam of light detects defects from the surface of the die. The first beam of light is directed into the back side of the semiconductor die which reflects a second light beam. Because the back side of the semiconductor die is the only surface positively claimed "which reflects a second light beam" no defects are imprinted onto the reflected second light beam.

Claim 10 is incomplete as to how any profile of the circuit side of the die is formed for comparison as there is no interference claimed.

Claim 11 is indefinite as to how the first beam of light detects defects from the surface of the die. The first beam of light is directed into the back side of the semiconductor die which reflects a second light beam. Because the back side of the semiconductor die is the only surface positively claimed "which reflects a second light beam" no defects are imprinted onto the reflected second light beam. Claim 12 is specific in that it is the back surface which reflects the second light beam.

Claim 11 is incomplete as to how any profile of the circuit side of the die is formed for comparison as there is no interference claimed.

Claims 1, 2, 7, and 9-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Marx et al(5,880,838).



Marx et al teach a light source(306) meeting the limitations of claims 1, 10, and 11 to a light source; first beam-splitter(310) meeting the limitations of claims 1, 10, and 11 to a first beam-splitter; sample(304), second beam-splitter(406) meeting the limitations of claims 1 , 10, and 11 to a second beam-splitter; and differential detectors(408,410), see figure 4. The difference between the TE and TM modes allows detection of the surface structures. Not taught is a defect detection embodiment or thinning any semiconductor dies.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the Marx apparatus when the defects desired to be detected are height defects. With regard to thinning the die beforehand applicant

points out that such thinning is well known in the art. See page 3, line 18+ of the specification.

(11) Response to argument

With regard to issues 1 and 2; Marx teaches a method and apparatus for measuring the dimensions of a microelectronic structure by interference profilometry. When the defects which are to be detected are height defects on the surface of the device the height of the surface needs to be measured. Marx measures the height of the surface of the object. Obviously the skilled artisan when detecting height defects would look to Marx to measure the surface profile from which the height defects can be detected.

With regard to the nondefective semiconductor of claim 2; how else can defects be detected unless compared to some standard. In the art such nondefective samples are known as standards or golden dies, these are first measured to input a ideal into a processor for comparison. Alteratively data can directly be input without the need for an actual standard.

With regard to a time differential or intensity of claims 3 or 16; Marx et al clearly detects the intensity of two different beams and produces a differential between the two detected beams.

With regard to thinning the die beforehand as in claim 4; applicant points out that such thinning is well known in the art. See page 3, line 18+ of the specification. Thus this limitations was admitted as known prior art by applicant.

With regard to issues 3 and 4; in claims 1, 10, and 11 applicant claims a step/means for analyzing third and fourth beams to determine a surface defect. Note that this is specifically a "surface defect". The claims are also specific in that the illuminating light is directed "into the back side of the semiconductor die" and not the front surface where the defect may be present. Applicant has fails to disclose how light entering for the back side of the die and reflected form the back side of the die contains defect information from the front surface of the die.

In the specification only a dual-differential detection is disclosed as the step/means for analyzing, see page 11, lines 10+ but the arrangement for such a detection system applied to the back side of a die is not disclosed.

With regard to issues 5 and 6; and the rejection of claims 1-16 under 35 U.S.C. § 112, second paragraph; applicant argues that 112/2 does not require that claims clearly disclose the details of specific embodiments. If the light never reaches the surface of the device which includes the defects then how can the defects be measured ? Section 112/2nd clearly requires that applicant particularly point out and distinctly claim the subject matter of the invention. With regard to method claims 1-9; a step of illuminating the defects is clearly missing. Thus these claims are incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2173.05(l). With regard to apparatus claims 10-16; there is no means, structure, or element claimed which illuminates or receives light reflected by the defects. Thus these claims are incomplete for

omitting essential elements or structure, such omission amounting to a gap between the elements or structure. See MPEP § 2173.05(l).

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Samuel A. Turner
Primary Examiner

Conferees
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Frank Font FF
Olik Chaudhuri OC

SAT
5/14/03